WI 203 – Vibration Analysis Level – 2 Training (In compliance to ISO 18436-2)

Approved Training Organization by BINDT (British Institute of Non-destructive Testing) to run Vibration Analysis Level – 2 Course.
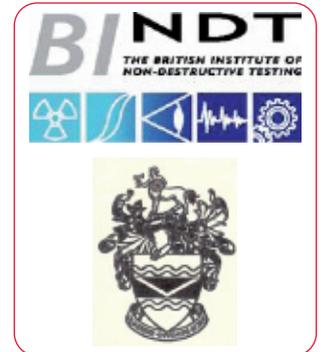
Recommended for

It is recommended that level 2 candidate have at least a secondary school science or technical qualification, or its equivalent. Vibration analysis personnel must be able to manipulate simple algebraic equations, and be familiar with the operation of personal computers. In addition the candidate who have completed formal or on-the-job training on machine knowledge, covering machinery and components, various condition monitoring techniques for a minimum period of 18 months.

Course objective

The use of the Vibration Analysis method in condition monitoring and diagnosis of faults in machinery and structures has become a key activity in predictive maintenance programmes for many industries. The effectiveness of this technology depends on the capabilities of individuals who perform the measurements and analyze the data.

Prerequisite:

Industrial exposure with minimum of 18 months experience with condition monitoring tools.

Course description

Designed for maximum class participation which includes group exercises, practical evaluation and written examination.

Principles of Vibration

- Basic Motion
- Period, Frequency
- Amplitude: Peak, Peak-to-Peak, rms
- Parameters: Displacement, Velocity, Acceleration
- Units, Unit Conversions
- Time and Frequency Domains
- Phase
- Natural Frequency, Resonance, Critical Speeds

Data Acquisition

- Instrumentation
- Dynamic Range, Signal-to-Noise Ratio
- Transducers
- Sensor Mounting, Mounted Natural Frequency
- Fmax, Acquisition Time
- Proximity Sensor Conventions (API)
- Triggering
- Test Planning
- Test Procedures
- Data Formats
- Recognition of poor data

Signal Processing

- Analog Sampling, Digital Sampling
- FFT Computation
- FFT Application
- Time Windows: Uniform, Hanning, Flat Top
- Filters: Low Pass, High Pass, Band Pass, Tracking
- Anti-aliasing
- Bandwidth, Resolution
- Noise Reduction
- Averaging: Linear, Synchronous Time, Exponential
- Dynamic Range

Condition Monitoring

- Computer data base set-up, Computer database maintenance
- Equipment Evaluation and Prioritization
- Alarms set-up: Narrowband, Envelope
- Baseline Assessments, Trending, Route Planning
- Alternate Technologies:
    - Lubrication management
    - Infrared Thermography
    - Motor current analysis
    - Acoustic emission
- Fault recognition

Fault Analysis

- Spectrum Analysis, Harmonics, Sidebands
- Enveloping
- Mass Unbalance
- Misalignment
- Mechanical Looseness
- Bearing Defects: Rolling Element, Journal
- Bearing defects: methods of detection [includes   shock pulse]
- Electric Motor Defects
- Resonance and Critical Speeds
- Gearbox analysis
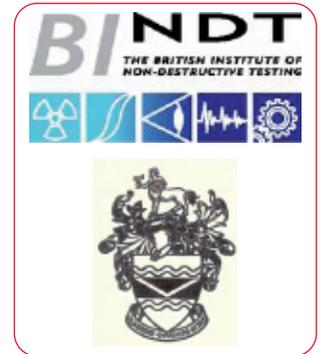
Corrective Action

- Shaft Alignment
- Field Balancing
- Basic maintenance action

Equipment Knowledge

- Electric Motors: Generators and Drives
- Pumps, Fans
- Steam Turbines, Gas Turbines
- Compressors
- Reciprocating Machinery
- Rolling Mills, Paper Machines and other equipment
- Machine Tools, Structures, Piping
- Rolling Element Bearings, Journal Bearings
- Gearing, Couplings, Belts

Acceptance Testing

- Test procedure
- Specifications and Standards, Reporting

Equipment Testing and Diagnostics

- Impact Testing
- Forced Response Testing

Reference Standards

- Relevant National Standards/IEC/ISO

Reporting and Documentation

- Condition Monitoring Reports
- Vibration Diagnostics Reports

Fault Severity Determination

- Spectrum Analysis
- Levels: Overall, Narrowband, Component
- Severity Charts; Graphs and Formula

Training Examination

Course length

5 Days (Minimum of 40 hours)